

The group with diabetic brothers or sisters shows a flat curve; 4 of these subjects were members of one family. Although no pertinent information could be had by questioning, it was suspected that this family tended to eat more carbohydrate food than the balanced diet permits. Obesity was present in these siblings.

The group with diabetic relatives in the past 2 generations showed a slight delay in the fall, as evidenced by the higher value in the one hour sample than in the other groups.

On the whole, no abnormalities appear constantly in the glucose tolerance in subjects who have maternal diabetic relatives, paternal diabetic relatives, diabetic relatives in the 2 preceding generations, or in those who have both maternal and paternal diabetic relatives.

The present study indicates that one cannot predict a diabetic tendency nor see an early indication of diabetes mellitus by constant abnormality in glucose tolerance in those whose relatives are known to have diabetes mellitus.

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Effect of Deuterium Oxide on Rat Sarcoma R-39.

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The work of Lewis¹ on the inhibiting effect of deuterium oxide (heavy water) on the germination of tobacco seeds and the investigations of Barnes² showing the suppression of cell division in spirogyra by dilute solutions of deuterium oxide led us to study its effects on tumor tissue. Recently Woglom and Weber³ reported that 0.40 to 0.42% deuterium oxide had no demonstrable effect on the growth of mouse sarcoma 180 or mouse carcinoma 63. Unaware of the above work we have been studying the effect of deuterium oxide on rat sarcoma R-39 for the past few months.

The deuterium oxide was obtained and analyzed by one of us (S. Y.) through the courtesy of Dr. Lloyd H. Reyerson of the Department of Chemistry. It was refluxed with acid dichromate, dis-

¹ Lewis, G. N., *J. A. C. S.*, 1933, **55**, 3504.

² Barnes, T. C., *J. A. C. S.*, 1933, **55**, 4332.

³ Woglom, W. H., and Weber, L. A., *J. A. M. A.*, 1934, **102**, 1289.

tilled, refluxed with potassium permanganate, and distilled again. Analysis by a density measurement showed the water to contain 0.11% deuterium oxide. The water was sterilized by autoclaving before use. No effect was noted in 4 normal rats, and 2 guinea pigs that received one cubic centimeter of this heavy water intraperitoneally every third day for 4 doses. This is in line with the work of Macht and Davis,⁴ who found no detectable effect in mice which were injected with 0.05% deuterium oxide.

Rats with rat sarcoma R-39 were received from Dr. F. C. Wood of the Institute for Cancer Research, Columbia University, and transplants from these tumors were made into young stock rats weighing 60-90 gm. This tumor was selected as it is reported to take in 100% of cases; in this study, however, we obtained takes in only 86% of cases. The rats successfully inoculated with the tumor were divided into 3 groups; one group of 50 rats had one cubic centimeter of 0.11% deuterium oxide injected in and around the tumor every other day until 10 doses were given; the second group of 50 rats received one cubic centimeter of sterile water in and around the tumor for a similar period of time; a third group of 20 rats received no treatment. The diet consisted of Champion Mink food throughout the experiment.

The results obtained were similar to those recently reported by Woglom and Weber. No effect on either tumor or host was observed in most of the rats to which 0.11% deuterium oxide had been given. The size and course of 44 of the tumors in this group were practically the same as those that received sterile water. Over two-thirds of the tumors in groups one and 2 were badly ulcerated by the end of the experiment. However, six (12%) of the tumors injected with heavy water seemed to show a more rapid growth and were slightly larger than any of the controls. The interpretation of this finding is not clear. While it may be due to individual variations in the rats, the rather high incidence (12%) and the fact that such large or rapid growth was not obtained in any of the controls, seems to make this finding more significant. Recently Barnes and Larson⁵ showed that dilute solutions of heavy water actually stimulated the growth of spirogyra.

Conclusions. 1. Heavy water in concentrations of 0.11% had no demonstrable effect on 4 normal rats. 2. No effect was observed in 44 of 50 rats inoculated with rat sarcoma R-39 to which the same concentration of heavy water was given. 3. However, 0.11% deu-

⁴ Macht, D. I., and Davis, M. D., *J. A. C. S.*, 1934, **56**, 246.

⁵ Barnes, T. C., and Larson, E. J., *J. A. C. S.*, 1933, **55**, 5059.

terium oxide seemed to have a stimulating effect on rat sarcoma R-39 in 6 of 50 rats so treated.

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Comparative Efficacy of Substances Employed in Prevention of Intra-Peritoneal Adhesions.

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In this study, the following substances were compared with regard to their relative effectiveness in preventing peritoneal adhesions in rabbits: defibrinated ox blood, defibrinated rabbit blood, amniotic fluid, amfetin,* sodium ricinoleate (1%), blood serum of dog, ether, hypertonic glucose (10%), normal saline, papain 1-50,000, air, air and sodium ricinoleate (1%), air and amfetin.

The method was as follows: under ether anesthesia, the abdomen of the rabbit was opened and a culture taken with sterile precautions. Intraperitoneal adhesions were produced by roughening the peritoneum and intestines with a knife or rubbing with gauze, and painting the raw surfaces with tincture of iodine. In 12 animals so treated (controls) 2 died from the procedure, and of the 10 surviving 9 developed peritoneal adhesions (90%). Twenty cubic centimeters of the substance to be tested were introduced into the peritoneal cavity after the iodine was applied. When air was also added, 20 cc. of the solution and 60 cc. of the air were used. About 10 rabbits were used in each series. In the 4 best series the effectiveness was studied in another 10 rabbits to make the number of animals used (20) significant. The rabbits were allowed to live one week before being killed, when a culture was again taken. The peritoneal reaction was studied. Adhesions were graded as slight, medium or dense. The results of the experiments are tabulated in Table I.

Results. The 4 substances that were most effective in preventing adhesions in this study were: Sodium ricinoleate (1%), 85%; Papain 1-50,000, 75%; Amfetin, 70%; defibrinated rabbit's blood 65%.

Ochsner and Garside demonstrated that papain and trypsin are inactive in the presence of infection. Sodium ricinoleate, or castor oil soap, not only prevented adhesions most often, but has the added

* Lilly trade name for amniotic fluid.